and consists of a tube, A B C, of which the extremity B is closely applied to the eye to be examined, thus shutting out all extraneous light. D is a paraffin lamp which can be easily connected or removed, the rays falling on a perforated mirror, and being reflected towards B, a convex lens being interposed near C, which can be approximated to or made to recede from the eye by the movement of the draw-tube B.

We have tried the instrument in a number of cases, and have found that while it enables a very good view of the fundus to be obtained with facility, it has the drawbacks of smelling disagreeably and also of becoming rather unpleasantly hot, from the proximity of the lamp to the eye of the observer—an inconvenience that might be remedied by placing the lateral tube at a greater distance from the end A.

H. POWER

SCIENTIFIC SERIALS

THE PROGRESS OF CHEMISTRY (*Jahresbericht über die Fortschritte der Chemie und verwandter Theile anderer Wissenschaften.*) Unter Mitwirkung von Th. Engelbach, Al. Naumann, W. Städel; herausgegeben von Adolph Strecker. Für 1868. Erstes Heft. Ausgegeben am 15 Februar, 1870. Giessen J. Ricker'sche Buchhandlung. 1870.

Of the 480 pages of this part, 133 are occupied by general and physical, and 155 by inorganic chemistry, the remainder being devoted to organic chemistry.

In the first section we find an account of the method devised by Hofmann for determining the vapour densities of solids and liquids in a Torricellian vacuum, and which promises such valuable results in many cases. Tomlinson's observations on the properties of chemically clean surfaces are here noticed; and also Guthrie's experiments on the conduction of heat by liquids. A long abstract of Becquerel's papers on electro-capillary action opens the section on electro-chemical investigations, and in the division on optical chemistry Tyndall's researches on the chemical action of light find a place. Two of the channels into which much chemical thought has been directed during [the last few years are clearly indicated by the notices of numerous papers on dissociation and spectrum analysis.

In the section on inorganic chemistry we have some additional experiments in support of Frankland's theory of the cause of the light emitted by luminous flames; the combustion of hydrogen and carbonic oxide in oxygen under a pressure of ten atmospheres, and the burning of heated phosphorus vapour in hot chlorine being mentioned. Graham's researches on the occlusion of hydrogen by metals, and on the curious combination which this element forms with palladium are noticed at considerable length. The next paper to which we shall direct attention is one which at present stands amongst those on inorganic chemistry, but the compounds herein described bid fair shortly to occupy a section by themselves in a position intermediate between mineral and organic bodies; we refer to the researches of Friedel and Ladenburg on silicic oxychloride, and silicium iodoform; the study of compounds having the same constitution as well-known organic bodies, but in which silicon plays the part of carbon, promises to enable us, ultimately, to explain the constitution of that very extensive class of complex bodies containing silicon, which are found so abundantly in nature. We have a long notice of Meyer's investigations of indium and its compounds, and one on Mills's researches on the ammoniacal cobalt compounds.

Among the papers on organic chemistry, we have that of Troost and Hauteufeille, on the decomposition of mercuric cyanide at different temperatures and pressures; and the very important one by Berthelot on the synthesis of hydrocyanic acid, which he obtained by the passage of electric sparks through a mixture of acetylene and free nitrogen. A considerable space is devoted to the researches of Jungfleisch on the chlorine derivatives of benzol, and to Oppenheim's investigations of the isomeric compounds of allyl and propylene. Berthelot's valuable researches on the hydrocarbons are continued, his observations on styrol and its compounds being given. The foundation of one of the most interesting and valuable discoveries of the last few years is contained in this volume, viz., the conversion of alizarin into anthracene by its distillation from powdered zinc. Since this paper was published, its authors, Messrs. Graebe and Liebermann, have succeeded (as our readers well know) in effecting the inverse transformation, and thus producing the colouring principle of madder from one of the products of the destructive distillation of coal. We also find here the discovery of the first acetylene of the aromatic series, by Glaser in acetenylbenzol or phenylacetylene. Linnemann's preparation of normal propylalcohol and the synthesis of butylalcohol by Lieben, are noticed, as are the researches of Stenhouse on tetra- and tri-chlorochinon.

All students of chemistry will heartily welcome the appearance of the Jahresbericht, though the usefulness of the first part is much impaired for want of the index. It is very much to be regretted that this very valuable book does not appear at an earlier date; in this case the first part of the report has been published thirteen months and a half after the expiration of the year to which it refers. It must be allowed that the labour required for such a work is very arduous, but it would be a great convenience to chemists if it were possible to expedite its publication. It is reported that the Council of the Chemical Society of London intends to issue fortnightly, or monthly, short abstracts of all papers on chemistry and the allied sciences published in England and abroad. These abstracts will be made by competent chemists, and will be printed as soon as possible after the appearance of the original memoirs. Such a collection of abstracts would be invaluable to many who, in consequence of their living away from London, or owing to other circumstances, have no opportunity of reading the periodicals: it would also be extremely useful to many who, though within reach of journals, have not the time to devote to the perusal of the very numerous papers published at the present time. All chemists, and many others taking a general interest in science, must wish every success to the efforts of the Council of the Chemical Society, though it is to be feared that such a journal would scarcely, at present at least, prove a commercial success.

THE *Revue des Cours Scientifiques* for May 7 contains M. Blanchard's lecture before the *Réunion des Sociétés Savantes*, at the Sorbonne, on Scientific Work in the Departments; the continuation of Bernard's lecture on Suffocation by Charcoal fumes; and the conclusion of M. Bouley's on Madness. In the number for May 14 we find M. Kuhne's lecture on the Science of Life, delivered on the occasion of the inauguration of the Physiological Laboratory at the University of Amsterdam; a paper by M. E. Fournier on the Ergot of Rye, being the first of a series on the parasites of cereals; and a continuation of M. Bernard's paper.

THE *American Entomologist and Botanist* for April contains several good articles. A paper entitled "Wheat-rust and barberry rust" (placed singularly in the entomological department), defends the accuracy of the statement well known to European botanists, but which appears to have been attacked in America, that the neighbourhood of barberry trees is a prolific cause of rust in wheat; the fungus which causes the latter disease, *Puccinia graminis*, and the fungus which produces the bright yellow spots on the leaves of the barberry, *Œcidium berberidis*, being, in fact, different conditions of the same plant. An article entitled "Scientific Language," justly rebukes the tendency to use long latinised words where plain English words would do just as well, and especially the coining of barbarous compound terms, derived from two or three different languages. There are also several good descriptive papers, both entomological and botanical, specially interesting to American naturalists and collectors.

SOCIETIES AND ACADEMIES

LONDON

Entomological Society, May 2.—Mr. A. R. Wallace, president, in the chair. Mr. Hewitson exhibited a collection of new and rare butterflies, from Tropical America.—Mr. Frederick Smith exhibited a collection of *Hymenoptera*, from Japan.—Mr. McLachlan exhibited some exotic dragon-flies.—Mr. Bates exhibited several new exotic *Copridæ*.—Mr. G. R. Crotch sent for exhibition British specimens of *Trachyphlœus laticollis*, a beetle not previously recorded as indigenous to this country.—Papers were read, on Equatorial *Lepidoptera*, by Mr. Hewitson; on some new *Neuroptera Odonata*, by Mr. McLachlan; on new *Copridæ*, by Mr. Bates; and on Australian *Curculionidæ*, by

Mr. Pascoe.—"A Catalogue of British Neuroptera," compiled for the society by Mr. McLachlan, and published by the society, was on the table.

Ethnological Society, May 10.—Special meeting held at the Museum of Practical Geology, by permission of Sir R. I. Murchison, Bart. Prof. Huxley, LL.D., F.R.S., in the chair. Dr. O'Callaghan was announced as a new member.—Col. Lane Fox read a letter from Lieut. Oliver, R.A., relative to the destruction of the fine menhir of Le Quesnel, in Jersey, described in the last number of the Society's Journal.—Sir J. Lubbock, Bart., and Mr. J. S. Mackie made remarks on the importance of the labours of the society in obtaining reports on the present condition of our megalithic monuments.—Prof. Huxley then delivered an address on the Ethnology of Britain. He showed that the early accounts of the inhabitants of these islands, such as that given by Tacitus, prove the existence of two types of people physically distinct—the one being tall, fair, yellow-haired, and blue-eyed, whilst the other was short and dark, with dark hair and black eyes. This dark type, as exemplified in the ancient Silures, closely resembled the people of Aquitania and Iberia, whilst the fair type of south-east Britain was physically related to the Belgæ of north-east France and what is now Belgium; and these again resembled the old Germani, who dwelt on the east bank of the Rhine. In this country both the fair and the dark people spoke Celtic—probably Cymric in Britain and Gaelic in Ireland. But on the Continent the dark type spoke a Euskarian or Basque tongue, while the ancient Gauls spoke Celtic and the Germani Teutonic. The Celtic and Teutonic languages both belong to the Aryan family, but the Euskarian appears to have no affinity to any other Eur-asiatic language. None of the invasions to which Britain has been subjected has introduced any new race-element. It is doubtful whether the Romans strengthened the fair or the dark type of the pre-existing population, but it is certain that the invasion of the Low Dutch from the shores of North Germany bordering on the Baltic and the North Sea strengthened the fair element, as also did the incursions of the Danes. The effect of the Norman conquest would be shown by Dr. Nicholas.—The Rev. Dr. Nicholas then read a paper "On the Influence of the Norman Conquest on the Ethnology of Britain." He first inquired what race-elements were present in Britain prior to the Conquest, and concluded that the blood preponderated considerably in favour of the ancient British race—a race which he did not hold to be purely Celtic. He then sought to determine what were the elements in William the Bastard's so-called "Norman" army, and showed that they were mainly Gaelic and Cymric. Hence the conclusion that the effect of this conquest was in the gross greatly gainful to the old British or Gallo-Celtic population.

MANCHESTER

Literary and Philosophical Society, March 22.—The following extract of a letter, dated March 21, 1870, from Sir William Thomson, D.C.L., F.R.S., hon. member of the Society, was read:—

"I have now at last got into good working order measurements of electrostatic capacity (which, perhaps, you may remember I was working on the first time you ever came to see me, and more or less almost ever since). I have two students of last year, junior assistants in my laboratory, measuring electrostatic capacities of condensers, and variations of specific inductive capacities of resistance, with sensibility of $\frac{1}{10}$ per cent., and with constancy in spite of accidental variations, generally within $\frac{1}{2}$ or $\frac{1}{3}$ per cent. My occupation on the Kinetic theory of gases has led me at last to come to definite terms as to the size of molecules. Ever since about the first year of my professorship I have taught my students that Cauchy's theory of Dispersion proves heterogeneousness, or molecular structure, to become sensible in contiguous portions of glass or water, of dimensions moderately small in comparison with the wave-lengths of ordinary light. I have spoken to you also, I think, of the argument deducible from the contact electricity of metals. This, I now find, proves a limit to the dimensions of the molecules in metals quite corresponding to that established for transparent solids and liquids by the dynamics of dispersion. In experiments made about ten years ago, of which a slight sketch is published in the Proceedings of the Literary and Philosophical Society of Manchester, I found that a plate of zinc and a plate of copper kept in metallic connection with one another (by a fine wire or otherwise) act electrically upon electrified bodies in their neighbourhood, and upon one another, as they would if they were of the same metal and kept at a difference of potentials equal to about three-quarters of that produced by a single cell of Daniell's. Hence, and from my measurement of the electrostatic effects of a Daniell's battery, published in the Proceedings of the Royal Society, for February and April, 1860, I find that plates of zinc and copper held parallel to one another at any distance, D, apart which is a small fraction of the linear dimensions of their opposed surfaces, and kept in metallic communication with one another, exercise a mutual attraction equal to

$$2 \times 10^{-10} \times \frac{A}{D^2} \text{ grammes weight.}$$

Hence, if they were allowed to approach from any greater distance, D', to the distance D, the work done by their mutual attraction is

$$2 \times 10^{-10} \times \frac{A(D'-D)}{D'D} \text{centimetre grammes};$$

which, if D is very small in comparison with D', is very approximately equal to

$$2 \times 10^{-10} \times \frac{A}{D}$$

Now suppose a pile to be made of a great number (N + 1) of very thin plates alternately of zinc and copper, kept in metallic connection while they are brought towards one another. Let their positions in the pile be parallel, with narrow spaces intervening. For simplicity let the thickness of each metal plate and intervening space be D. The whole work done will be

$$2 \times 10^{-10} \times N\frac{A}{D}$$

The whole mass of the pile (if we neglect that of one of the end plates) is

$$NAD\rho,$$

where ρ denotes the mean of the densities of zinc and copper. Hence, if h be the height to which the whole mass must be raised against a constant force equal to its weight at the earth's surface, to do the same amount of work, we have

$$NAD\rho h = 2 \times 10^{-10} \times N\frac{A}{D}$$

which gives

$$h = \frac{2 \times 10^{-10}}{\rho D}$$

or, as $\rho = 8$, nearly enough for the present rough estimate,

$$h = \frac{1}{(200000D)^2},$$

Hence, if

$$D = \frac{1}{200000} \text{ centimetre,}$$
$$h = 1 \text{ centimetre.}$$

The amount of energy thus calculated is not so great as to afford any argument against the conclusion which general knowledge of divisibility, electric conductivity, and other properties of matter indicates as probable: that, down to thicknesses of $\frac{1}{200000}$ of a centimetre for the metal plates and intervening spaces, the contact electrification, and the attraction due to it, follow with but little if any sensible deviation the laws proved by experiment for plates of measurable thickness with measurable intervals between them. But let D be a two-hundred-millionth of a centimetre. If the preceding formulæ were applicable to plates and spaces of this degree of thinness we should have

$$h = 1{,}000{,}000 \text{ centimetres or 10 kilometres.}$$

The thermal equivalent of the work thus represented is about 248 times the quantity of heat required to warm the whole mass (composed of equal masses of zinc and copper) by 1° Cent. This is probably much more than the whole heat of combination of equal masses of zinc and copper melted together. For it is not probable that the compound metal when dissolved in an acid would show anything approaching to so great a deficiency in the heat evolved below that evolved when the metallic constituents are separately dissolved, and their solutions mixed; but the experiment should be made. Without any such experiment, however, we may safely say that the fourfold amount of energy indicated by the preceding formula, for a value of D yet twice as small, is very much greater than any estimate which our present knowledge allows us to accept for the heat of combination of zinc and copper. For something much less than the thermal equivalent of that amount of energy would melt the zinc and copper; and, therefore, if in combining they generated by their mutual attraction any such amount of energy, a mixture of zinc and copper filings would rush into combination (as the ingredients of gunpowder do) on being heated enough in any small part of the whole mass to melt together there. Hence we may infer that the electric attraction between metallically-connected plates of zinc and copper of only $\frac{1}{400000000}$ of a centimetre thickness, at a distance of only $\frac{1}{400000000}$ of a centimetre asunder, must be greatly less than that calculated from the magnitude of the force and the law of its variation observed for places of measurable thickness, at measurable distances asunder. In other words, plates of zinc and copper so thin as a four-hundred-millionth of a centimetre from one another, form a mixture closely approaching to a molecular combination, if, indeed, plates so thin could be made without splitting atoms. Wishing to avoid complication, I have avoided hitherto noticing one important question as to the energy concerned in the electric attraction of metallically connected plates of zinc and copper. Is there not a change of temperature in molecularly thin strata of the two metals adjoining to the opposed surfaces, when they are allowed to approach one another, analogous to the heat produced by the condensation of a gas, the changes of temperature produced by the application of stresses to elastic solids which you have investigated experimentally, and the cooling effect I have proved to be produced by drawing out a liquid film which I shall have to notice particularly below? Easy enough experiments on the contact electricity of metals will answer this question. If the contact-difference diminishes as the temperature is raised, it will follow from the Second Law of Thermodynamics, by reasoning precisely corresponding with that which I applied to the liquid film in my letters to you of February 2nd and February 3rd, 1858,* that plates of the two metals kept in metallic communication and allowed to approach one another will experience an elevation of temperature. But if the contact difference increases with temperature, the effect of mutual approach will be a lowering of temperature. On the former supposition, the diminution of intrinsic energy in quantities of zinc and copper, consequent on mutual approach with temperature kept constant, will be greater, and on the latter supposition less, than I have estimated above. Till the requisite experiments are made, further speculation on this subject is profitless: but whatever be the result, it cannot invalidate the conclusion that a stratum of $\frac{1}{200000000}$ of a centimetre thick cannot contain in its thickness many, if so much as one, molecular constituent of the mass. Besides the two reasons for limiting the smallness of atoms or molecules which I have now stated, two others are afforded by the theory of capillary attraction, and Clausius' and Maxwell's magnificent working out of the Kinetic Theory of gases. In my letters to you already referred to, I showed that the dynamic value of the heat required to prevent a bubble from cooling when stretched is rather more than half the work spent in stretching it. Hence, if we calculate the work required to stretch it to any stated extent, and multiply the result by $\frac{3}{2}$, we have an estimate, near enough for my present purpose, of the augmentation of energy experienced by a liquid film when stretched and kept at a constant temperature. Taking ·08 of a gramme weight per centimetre of breadth as the capillary tension of a surface of water, and therefore ·16 as that of a water bubble, I calculate (as you may verify easily) that a quantity of water extended to a thinness of $\frac{1}{200000000}$ of a centimetre would, if its tension remained constant, have more energy than the same mass of water in ordinary condition by about 1,100 times as much as suffices to warm it by 1° Cent. This is more than enough (as Maxwell suggested to me) to drive the liquid into vapour. Hence if a film of $\frac{1}{200000000}$ of a centimetre thick can exist as liquid at all, it is *perfectly certain* that there cannot be many molecules in its thickness. The argument from the Kinetic Theory of gases leads me to quite a similar conclusion.

April 19.—Annual meeting, Dr. J. P. Joule, F.R.S., President, in the chair. The report of the council having been read, the following gentlemen were elected officers of the society for the ensuing year:—President: E. W. Binney, F.R.S., F.G.S.; Vice-presidents: Dr. J. Prescott Joule, F.R.S., Dr. E. Schunk, F.R.S., Dr. R. Angus Smith, F.R.S., Rev. W. Gaskell, M.A.; Secretaries: Dr. H. E. Roscoe, F.R.S., &c., J. Baxendell, F.R.A.S.; Treasurer: T. Carrick; Librarian: C. Bailey. Of the Council: P. Spence, F.C.S., G. Venables Vernon, F.R.A.S., J. B. Dancer, F.R.A.S., W. Leeson Dickinson, H. Wilde, R. Dukinfield Darbishire, F.G.S. A paper on "Infant Mortality in Manchester" was read by Mr. J. Baxendell, F.R.A.S., who combated the assertion that the high death-rate of Manchester and other towns in the cotton manufacturing districts is due to the mortality among infants and young children being relatively much greater than in large towns in other parts of the country, a careful examination of the mortality returns showing that a much larger proportional number of deaths of infants and young children takes place in other towns, where the general death-rate is decidedly lower.

CAMBRIDGE

Cambridge Philosophical Society, May 2.—Clement Higgins, B.A., Downing College, was elected a fellow. Communications:—By Professor Miller, F.R.S.: "On the best form for the ends of measures *à bouts*." The author found that the best form was that of two 'knife edges,' whose edges were in planes perpendicular to each other, and were not straight lines, but arcs of circles, whose centre was the opposite end of the axis of the bar. With this form the error (l being length of bar, and e distance between real and assumed position of the point where the axis intersects the bounding surface) $=\frac{e^4}{4l^3}$ while in the forms commonly used it was either $\frac{e^2}{l}$ or $\frac{2e^2}{l}$

By Mr. Bonney (St. John's College): Note on supposed Mollusc Borings in the limestone of Derbyshire. The author first described a large number of burrows which he had examined in the hills above Matlock; these were generally directed upwards, and too irregular in form to be *Pholas* burrows, as had been asserted; he then described some burrows observed in a scarp of limestone about nine feet above the stream in Miller's Dale, by the road-side. He believed this scarp to be artificial; but whether so or not, the gorge was most distinctly one of fluviatile erosion, and he maintained that this case was fatal to the *Pholas* theory. He considered the burrows to be the work of *Helices*.

BRIGHTON

Brighton and Sussex Natural History Society, April 14.—Mr. Glaisher, Vice-president, in the chair. A communication from Mr. Gwyn Jeffreys respecting the Sars testimonial, was read by the Hon. Sec., after which a subscription was made among the members present, the Society not having power to vote its own funds for such a purpose. Mr. T. H. Hannah, the President, read a report on "Soundings made by Sir (Captain) E. Parry in 1818." These soundings were purchased some years since among the geological specimens of Sir E. Parry, from his widow, by Mr. J. Cordy Burrows, of Brighton, who deposited the geological specimens in the Brighton Museum, and gave the soundings to Mr. Peto. The discoveries of last year giving a prominence to sea-soundings, they were placed in January in Mr. Hannah's hands to examine microscopically, and report on their contents to the society. The soundings were made in Davis's Straits, and Lancaster Sound between 68° and 71° 15′ N. lat. and 73° and 78° 34′ W. long. at depths between 22 fathoms and 1,058 fathoms. Those under 58 fathoms contained nothing but stones and corals, some of the stones had evidently been rubbed by the action of a strong current; those from 201 fathoms were much less disturbed and consisted chiefly of a sandy material; from 674 fathoms there was an almost absence of inorganic débris, showing the non-existence of currents, and plenty of the testa of arenaceous foraminiferæ. In all the deep ones diatomaceæ were very beautiful, as well as sponge spicules and arenaceous foraminiferæ; but polycystinæ and cretaceous foraminiferæ were but sparsely found. He had also met with casts similar to those found in the greensand, and some highly organised spicules which he had not yet identified. At one of the microscopical meetings the slides would be exhibited. He much regretted they were not examined earlier, as they would then have preceded the discoveries of Carpenter and others, who, by the deep-sea soundings recently made, had opened out new ideas of life at great depths. Reference was then made to what had been done by Carpenter, Jeffreys, Thomson, and others in adding to our knowledge of the conditions of existence in deep sea; the nature of the animals and their economy together with the chemical conditions at great depths were also touched on, and the fact pointed out that changes of fauna depended not on latitude, but on the variations in the bottom temperature.—Mr. Wonfor, hon. sec., announced that the "Moss Flora of Sussex" was ready for distribution among the members, and that duplicate copies could be had at a nominal price, by applying to him, at 38, Buckingham-place, Brighton.

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* Proceedings of the Royal Society for April, 1858.

DUBLIN

Natural History Society of Dublin, May 4.—W. Andrews, Chairman of the Natural History Committee of the Royal Dublin Society, in the chair. The Chairman read a paper entitled "Ichthyological Notes." There are no subjects fraught with greater interest than discoveries which arise from a practical knowledge of any branch of science, whether it relates to botany, geology, or to any of the orders or genera of zoological investigations. When we contemplate the vast scope of the branches of the natural sciences, we cannot fail to meet most perplexing difficulties in the determining of correct classification, the opportunity of practical investigation not being afforded, for without that most essential aid, no certainty can possibly be arrived at, especially true characteristics depending upon habit, geographical range, seasons, depths, and peculiarities of soundings, and those natural causes which influence forms and changes of animal and vegetable life. The subject of the paper this evening relates to deep-water species, the present observations being with reference to notes on some fish occurring on the south-west coast of Ireland, in Dingle Bay, and off the coast of Kerry. Some most interesting crustaceans and species of rare fish have been met with, which are confined to peculiar soundings in deep water; yet I may say that at a depth beyond eighty fathoms much of interest as to variety of forms ceases, and the dredge in soundings of 100 fathoms, and beyond that depth, rarely brings up anything but remains belonging to shallower soundings, or those forms of Foraminifera Globigerina, which require microscopic manipulation in the determining of their numerous forms. It is singular, however, from what extreme depths minute crustacea, echinoderms, sponges, and corals are brought up; therefore I may say that when we proceed further than a depth of eighty fathoms, the interest, so far as the ichthyologist is concerned, closes. The object of this paper is to bring to notice a most interesting species of the Clupæidæ, the true anchovy (*Engraulis encrasicholis*) the first placed on record as captured on the shores of Ireland. I had heard of a species of small herring that had been taken in the herring nets, of a peculiar silvery brightness. I was delighted to obtain a specimen last autumn off Ventry Harbour, being another among the many interesting additions that have been made on that part of the coast of fish peculiar to the Mediterranean. The specimen exhibited is of full size, being in length six inches, thicker in proportion than the herring, no serrations on the abdomen, and the sides and belly being of the most silvery brightness, with no apparent scales. The back was a dark bluish green; the mouth with a remarkably wide gape; teeth exceedingly minute in the maxillary; none in the lower jaw; snout much projecting. At first examination I thought it might be a species of melletts, as it did not bear sufficient resemblance to several of the figures of the anchovy in works on ichthyology.—Dr. Foot then read a paper on the breeding of the Cereopsis Geese and Emus, in the Zoological Gardens, Dublin, and also laid before the meeting a paper on "Animal Luminosity," after which the meeting adjourned.

Royal Irish Academy, Monday, May 9.—Rev. Professor Jellett, B.D., president, in the chair. Dr. Stokes, V.P., F.R.S., read a paper on putrefaction occurring in some closed cavities, without the admission of air, and on the germ theory of Professors Lister and Tyndall.

Royal Geological Society, Wednesday, May 11.—Mr. G. Sanders, in the chair. Rev. Professor Haughton, M.D., read a paper on the probable geological effects of the permanent opening of the Suez and Darien Canals. The author regarded the Suez Canal as an interference with nature. He gave a graphic description of the two oceans, the Atlantic and Indian, with their two great offshoots, the Mediterranean and the Red Sea—seas with not a very limited rainfall area, and subject to immense evaporation; in fact, having all the circumstances in their favour to make them the seat of strong currents, the natural tendency of the meeting of which is to build up that vast sand or mud bar, the Isthmus of Suez. The new canal he regarded as a scratch of a spade by the hand of a child across the bar of two oceans, and the re-formation of that bar he regarded as certain—it would probably be re-formed beyond Port Said. He thought the Darien Canal would have a totally different success. The idea of forming this canal originated with Dr. Cullen, of Dublin. Nature, in scooping out the great gulf in which the West Indian islands lie, showed her determination to break through the Isthmus somewhere, and the great South Atlantic current would keep any canal open that was cut. The Americans thought that they would lower the temperature of Europe by removing so much of the Gulf Stream from us. But if their canal was one mile wide and 100 feet deep, they would take from us but $\frac{1}{1000}$ part of the heat we already possessed; and to make up this deficiency would cost the inhabitants of Dublin not more than 2*s.* 4*d.* for additional fuel to each family—a sum they might well lose for the good of the whole race. The palæontological effects would not be of much interest in the case of either canals: a few Red Sea cockles might wander into the Mediterranean, and even this would not occur in the Darien Canal, as the same species of fish and molluscs were found on both sides of the Isthmus of Panama; and man must not forget that he has no power over nature.—The Rev. Maxwell Close read a paper "On some Corries, and their Rock Basins, in Co. Kerry."

Institution of Civil Engineers of Ireland, May 11.—John Bailey, C.E., in the chair. Mr. Alex. McDonald read a paper, "Notice of Le Chatelier's Counter-pressure Steam System." Professor Downing, LL.D., read "Notes on the Transport of Minerals by wire ropes." The author suggested the use of stationary wire rope, the mineral boxes to be pulled up by a common hempen rope, and to slide up the wire rope.

EDINBURGH

Royal Physical Society, April 27.—R. F. Logan, president, in the chair. Thomas Edmonston of Buness, Shetland, was elected a member of the society; and the Rev. Samuel Fraser, Melbourne, Australia, a corresponding member. The following communications were read to the meeting:—I. Our Pets in Unst, Shetland, by Thomas Edmonston of Buness, F.R.S.L. A vote of thanks was given to Mr. Edmonston for his interesting communication, notice being taken by Mr. Scott Skirving of the fact that the thanks of all naturalists were due to him as the preserver, on his estate in Shetland, of one of the few breeding places still remaining in Britain of the Great Skua Gull. II. Australian Entomology.—Notices of the Tarantula (Spider) and Hornet, by A. F. Grieve, Brisbane, Queensland. Communicated by D. Grieve. The President (Mr. Logan) said the insect called a hornet by Mr. Grieve was a species of *Pelopæus*, belonging to the family *Sphegidæ*; it was probably *P. lactus*. The habit of this genus is to store up spiders in mud cells, but surely it could not do this with the immense *sleygale*, which Mr. Grieve had also described. III. (1.) On the Skull of the Ringed Seal (*Pagomys fœtidus*, Gray), with special remarks on the osteological characters of the lower jaw. By James M'Bain, M.D., R.N. (2.) Notice of Clay Nodules, found at a depth of 292 feet in boring for an Artesian Well at Umballah, in India. By Thomas Login, C.E., F.R.S.E. Communicated by James M'Bain, M.D., R.N. IV. (1.) Note of a saline incrustation sold by the natives at Old Calabar, Africa. (Specimens sent to Dr. Smith by the Rev. Dr. Robb were exhibited.) (2.) Ornithological notes. (Specimens exhibited.) (3.) Notice of the capture of the Spiny Lobster (*Palinurus vulgaris*) on the west coast of Scotland. (Specimen exhibited.) (4.) Note of the capture of the *Seymnus borealis*, the Greenland shark, in the Frith of Forth. By John Alexander Smith, M.D. V. Notes of various species of *Crustacea* from Shetland, Caithness, &c. By C. W. Peach. (Specimens exhibited.)

Botanical Society, April 14.—Sir Walter Elliot, president, in the chair. The following communications were read:—On the Flowering and Fruiting of *Aucuba Japonica*, by Mr. P. S. Robertson. The author had observed that recently-introduced female plants from Japan (grown in a cold pit) came into flower in January and February, while the male plants, grown in the same circumstances, never came into flower till the middle of March. Yet he had every year obtained a crop of young seedlings from the berries, although the female flowers were quite shrivelled before the male ones expanded. He found that the common spotted variety, long grown in this country, does not flower till May or June, although grown in the pit or house with the others, and begins to expand its flowers when the males are getting past; yet it also never fails to produce a crop of fruit with perfect seeds. He thought that the pollen must lodge for some time in the scales of the unopened flower-buds, or must reach the pistils before the flowers are expanded; but how to account for the fertilising of the early flowering varieties, he was at a loss. This year he has forced on the flowering of the male plants by placing them in strong heat, and has all the varieties of the male and female plants in full flower at very nearly the same time, and accordingly he anticipates a much larger produce of berries than in former years, when they were left to the ordinary course. He exhibited a branch bearing berries with perfect seed; yet when that plant came into flower, there had not been a male plant in the house where it grew for fully a month previously. Mr. Sadler stated that he had been informed by the Messrs. Lawson that when there was a great lapse of time between the flowering of male and female Aucuba plants, they frequently collected the pollen and kept it wrapped in paper until such time as the female flowers were ready for fertilisation, when it was applied to the stigmas, and thus secured invariably a crop of fruit with perfect seeds. By grafting the male plant on the female, the two kinds of flowers might expand nearly at the same time.—"Remarks on *Grimmia pruinosa* (Wilson's MSS.)." By Mr. William Bell. — "Remarks on *Bœhmeria nivea* (*Urtica nivea* of Linnæus)." By Mr. Sadler.—"Memorandum on Ipecacuanha." By Mr. Clements R. Markham.—"Report on the Open-air Vegetation at the Royal Botanic Garden." By Mr. M'Nab.—"Remarks on the Embryos of the White Water-Lily (*Nymphœa alba*), and the Date Palm (*Phœnix dactylifera*)." By Professor Dickson.

PARIS

Academy of Sciences, May 9.—The following mathematical papers were read:—"Some results obtained by the infinitely small displacement of an algebraical surface," by M. A. Mannheim, presented by M. Chasles; "On the division of hyperelliptical functions," by M. C. Jordan; and "On the existence of new classes, each containing an unlimited number of plane algebraical curves, the arcs of which present an exact representation of the elliptical functions of the first kind," by M. Allibert.—MM. Croullebois presented a reply to the remarks of M. Jamin, on the index of refraction of water.—A note, by M. G. Guéroult, on harmonic and melodic intervals, was presented by M. H. Sainte-Claire Deville.—A memoir, by M. C. A. Valson, on molecular actions, based on the theory of capillary action, was also presented by M. H. Sainte-Claire Deville.—M. C. Sainte-Claire Deville presented a note by M. E. Renou, on the latent heat of ice, in reply to M. Jamin's note, read at the last meeting.—M. Fizeau called the attention of the Academy to some errors which, he thought, had slipped into a communication by Father Secchi.—M. Regnault presented, in the name of M. Pfaundler, a claim of priority in the method employed by M. Jamin for the determination of specific heats.—M. Delaunay presented a note on the sun's spots, by M. Sonrel, in which the author called attention to some photographs exhibited by him, by which the perturbations of the surface of the sun are shown to have been lately remarkably active; a note, by M. H. Tarry, indicating the chief points of M. Respighi's theory of scintillation; and a second note, by the same author, on showers of dust and blood-rains. The author ascribed these phenomena to the action of cyclones upon the desert of Sahara.—MM. A. W. Hofmann and O. Olshausen communicated a memoir on the isomers of the cyanuric ethers.—M. Wade communicated a note confirmatory of M. Duchemin's remarks on the destruction of carp by toads; he referred to toads found fixed upon pike. M. d'Esterno remarked that the toads thus found attached to fishes were all males, and that this attack took place only at the breeding-time of the toads.—M. C. Robin presented a note by MM. Legros and Onimus, on the choreimorphic movements of the dog; and M. Balard communicated an extract of a letter from M. Castelhaz, on the employment of bromide of sodium, instead of bromide of potassium, as a medicine. The following papers were also read:—"A memoir on solids subjected to flexion," by M. L. Aubert; and "A note on the preparation of optically neutral sugar," by M. Maumené.

VIENNA

Imperial Academy of Sciences, April 7.—Prof. Barth presented a memoir on isomeric cresoles.—Dr. Boué made some propositions for the purpose of getting rid of the ignorance which prevails as to the intellectual doings of certain foreign nationalities. He suggested that the transactions of academies established in certain places should be accompanied by translations or abstracts in French, German, or English.—M. G. Tschermak presented a memoir containing the results of an investigation of the meteorite of Lodran, near Mooltan, which fell on the 1st October, 1868, with a notice of a specimen of meteoric iron presented to the Mineralogical Museum, from the desert of Atacama.—A memoir, having the title of *Formicidæ neogranadenses*, by Dr. Gustave Mayr, was read, containing an account of the species of ants found in New Granada, and referring especially to those forms which throw light upon the affinities of the Formicidæ.—Dr. E. Reitlinger communicated the results of an investigation upon the spectra of negative electrodes, and of Geissler's tubes which have been long in use, which he had carried on in conjunction with Prof. M. Kuhn. The observers compared the spectra of the negative electrodes in Geissler's tubes with nitrogen, hydrogen, and oxygen, with those of the other parts of the tube, and found them to differ. To Wüllner's observations on the production of a new spectrum in hydrogen tubes after long use, the observers added similar results with nitrogen tubes. The fluorescence of the glass extends in these tubes to other parts than those immediately around the negative pole.—M. F. Unferdinger presented a memoir on the transformation and determination of the integral

$$\iiint F\left(\frac{x^2}{a^2} - \frac{y^2}{b^2} - \frac{z^2}{c^2},\ \alpha x + \beta y + \gamma z\right) dx\, dy\, dz$$

—Prof. Biesiadecki presented some investigations upon vesicle-formation and regeneration of the epithelium in the swimming membrane of the frog.—The report of the Central Observatory for meteorology and terrestrial magnetism for the month of March was communicated to the meeting.

April 21.—A memoir was read on some Pleuronectidæ, Salmonidæ, Gadoidæ, and Blennidæ, from Decastris Bay and Viti Levo, by Dr. F. Steindachner and the late Prof. R. Kener. Also one on the solution of dead organic matters, and one on the process of development and the structure of the walls of woody fibre, by D. T. Hartig, and one on the construction of a conic section, when this is defined by imaginary points and tangents.—Dr. Fitzinger presented the first part of his critical revision of the true Bats (*Vespertiliones*), containing the genera *Diclidurus*, *Taphozous*, *Saccolimus*, *Emballonura*, *Uroccyptus*, *Mystacina*, *Centronycteris*, *Saccopteryx*, and *Mosia*.—Dr. Horwath presented a paper on the production of inanition in animals by deprivation of heat.

April 28.—The following memoirs were read:—On the fish fauna of the Senegal (conclusion), by Dr. F. Steindachner; on the perfecting of involutions of high orders, by Dr. Emil Weyr; and on the determination of the sum of the angles of plane polygons, by M. A. Steinhausen.—M. von Haidinger reported upon some new observations relating to meteorites.—Dr. Boué again referred to his suggestion that the academies of northern and eastern Europe should furnish translations or abstracts of their memoirs in one of the three most familiar European languages.—Dr. T. Oppolzer presented a memoir on the transit of Venus in the year 1874.

NEW ZEALAND

Wellington Philosophical Society, January 29.—Annual meeting, Mr. J. C. Crawford in the chair. The election of the following office-bearers for the year took place, viz.:—President—Hon. W. B. D. Mantell, F.G.S. Vice-Presidents—J. C. Crawford, F.G.S.; R. Pharazyn, F.R.G.S. Council—W. T. L. Travers, F.L.S.; James Hector, M.D., F.R.S.; J. Kebbel; Wm. Lyon, F.G.S.; W. L. Buller, F.L.S.

Dr. Knox then gave a description of a specimen of *Bernardius Arnuxii*, which had been recently captured in the harbour, and the most important parts of the skeleton of which he had secured for the Museum. The animal was evidently full grown, and measured thirty-three feet, and what he desired to draw special attention to was the fact that while it presented well-developed teeth, yet they did not project through the gums, but were included in a deep socket with the tip covered in by thick fleshy gums. The use of such teeth, he considered, must be limited to the stimulation of the salivary glands by a reflex nervous process, as they could neither seize, divide nor masticate the food of the whale. Messrs. Mantell and Travers both considered that the teeth exhibited marks of the attachment of the gum round a projecting point of polished enamel, and that the teeth were probably enclosed in the retractile sheath of the gum. Dr. Hector stated that, in a recent description by Dr. Haast of a whale of the same species, it was stated to have shown its teeth when infuriated, which supported the view that the teeth were not completely undeveloped externally.—The next communication by Dr. Hector, on the interior of the North Island, gave the leading features of the geology of the Kaimanawa and Ruahine ranges, which had been recently examined by him. The modern tertiary rocks that form the eastern portion of the Hawke's Bay province, were described as rising in the interior to an altitude of 2,700 feet, but that it was probable that the Kaimanawa range and certain parts of the Ruahine mountains had always remained as islands above the tertiary sea. The tertiary rocks comprise three groups—1. Limestone containing a large percentage of existing shells; 2. Clay marls, containing few shells; and 3. Sandstones and conglomerates with irregular seams of coal, some of which might yet prove valuable as fuel. The upper group is of much later date than the others, but all are distinctly tertiary. The axis of slate rocks, which divided the tertiary series at the time of the development of the conglomerates, is within twenty miles of the present East Coast line, but is broken through by several modern rivers which rise in the Taupo plains; so that easy passes exist from Napier to the interior, a circumstance which has an important bearing on the opening up of the country. The Kaimanawa range is formed of the same slate and sandstone rocks as the Ruahine, but it lies at a considerable distance to the west of the proper axis of the island. The space left between them is occupied by the same tertiary rocks as on the east side, and which slope gradually to the sea-coast at Wanganui. As the tertiary rocks are quite free from any trace of volcanic matter, the eruption of the central volcanoes must have commenced after their deposit was completed. In referring to the auriferous specimens which had been found on Mr. Lyon's run at Kereru, Dr. Hector stated that chemical analysis had proved that, notwithstanding its granitic appearance, the rock to which the gold quartz was attached was only an altered form of the sandstone, as it contained traces of graphite, and 91 per cent. of silica. This is strongly in favour of the view that it is derived from the Ruahine range, as the sandstones in them have been previously mistaken for granite. After alluding to the recent increase in the activity of the volcanic forces in the Tongariro district, Dr. Hector described the route to the West Coast from the interior, and drew attention to maps and reports by Mr. Geo. Swainson and Mr. Field. He also exhibited a new geological map of the central district. The Hon. Mr. Fox considered that there was no doubt of the practicability of a route to Taupo district from the Wanganui coast. He believed that the track through the bush country was almost completed, and he was glad to find that no insurmountable obstruction would be encountered beyond that point. In reply to Mr. Mantell, Dr. Hector stated that he did not think that any rich auriferous quartz had been obtained in the Kaimanawa, but that his opinion remained unchanged as to the probability that gold would yet be met with in the district he had described.

PHILADELPHIA

American Philosophical Society, March 4.—A paper was read entitled "On the Periods of certain Meteoric Rings," by Prof. Daniel Kirkwood. Mr. P. E. Chase discussed the subject of the tides, referring to the recently-published theory of Prof. Challis, and contrasting his views with those of Airy and others. Prof. Cope read a paper "On *Adocus*, a genus of Cretaceous Emydidæ." Dr. Brinton read a paper entitled "Contributions to a grammar of the Muskokee language."

March 18.—Prof. Cope described the disinterment of a number of human remains from a pit in New Jersey, which probably belonged to some of the first European emigrants, whose history has not been preserved. He also exhibited photographs of human foot-tracks, sculptured in Cretaceous rocks of Kansas, and made observations on vertebræ of a large gavial from New Jersey. Dr. Brinton made some observations on a dictionary of the Maya language.

April 1.—Dr. F. V. Hayden described the position and appearance of the Tertiary strata on Green River, Wyoming Territory, mentioning the highly bituminous character of the shales. Prof. Cope exhibited two species of fishes from them, which he regarded as new, and named *Cyprinodon levatus*, and *Clupea pusilla*, and stated that their presence indicated connection with tide-water. Dr. Hayden mentioned the occurrence of insects and Myriopoda in the same shales.

DIARY

THURSDAY, MAY 19.

ROYAL SOCIETY, at 8.30.—Experiments on the Use of Alcohol (ethyl alcohol) in the Human Body: Dr. Parkes and Count C. Wollowicz.—On the Cause and Theoretic Value of the Resistance of Flexure in Beams subjected to Transverse Stress: Mr. W. H. Barlow.—On Deep-sea Thermometers: Commander J. E. Davis, R.N.—On the Difference between a Hand and a Foot, as shown by their Flexor Tendons; Rev. Dr. Haughton, and other papers.

SOCIETY OF ANTIQUARIES, at 8.30.—On recent discoveries in the Roman Wall, comprising Eighteen inscribed Altars: Rev. C. J. Bruce.

CHEMICAL SOCIETY, at 8.—On some Bromine Derivatives of Coumarine: W. H. Perkin, F.R.S.

ANTHROPOLOGICAL SOCIETY, at 8 (at St. James's Hall).—Race in Music: Henry F. Chorley.

ROYAL INSTITUTION, at 3.—Electricity: Prof. Tyndall.

FRIDAY, MAY 20.

ROYAL INSTITUTION, at 8.—Atoms: Prof. Williamson.

SATURDAY, MAY 21.

ROYAL INSTITUTION, at 3.—Comets: Prof. Grant.

MONDAY, MAY 23.

ROYAL GEOGRAPHICAL SOCIETY, at 1.—(Anniversary Meeting.)

VICTORIA INSTITUTE, at 4.—(Anniversary Meeting.)

LONDON INSTITUTION, at 4.—Botany: Prof. Balfour.

TUESDAY, MAY 24.

LINNEAN, at 3.—(Anniversary Meeting.)

ETHNOLOGICAL SOCIETY, at 4.—(Anniversary Meeting.)

INSTITUTION OF CIVIL ENGINEERS, at 8.—Discussion on Hot Blast Stoves.—On the Relative Safety of different Methods of Working Coal: George Fowler.—On Coal Mining in Deep Workings: Mr. Emerson Bainbridge, Stud. Inst. C.E.

WEDNESDAY, MAY 25.

GEOLOGICAL SOCIETY, at 8.

THURSDAY, MAY 26.

SOCIETY OF ANTIQUARIES, at 8.30.

ZOOLOGICAL SOCIETY, at 8.30.—On Dinornis (Part XVI.), containing Notices of Internal Organs of some Species, with a Description of the Brain and some Nerves and Muscles of the Head of the Apteryx australis: Professor Owen, F.R.S.—Notes on the Anatomy of the Prongbuck (Antilocapra americana): Dr. J. Murie.—Some Remarks on the Poison Glands of the Genus Callophis: Dr. A. B. Meyer.—Notes on some Fishes from the Western Coast of India: Surgeon Francis Day.

ROYAL INSTITUTION, at 3.—Electricity: Prof. Tyndall.

BOOKS RECEIVED

ENGLISH.—Balfour's Class Book of Botany, 3rd Edition (A. and C. Black).—Meteorology: Sir J. F. W. Herschel (A. and C. Black).—How Crops feed: S. W. Johnson (Trübner and Co.).—Lecture Notes for Chemical Students, Vol. I.; Inorganic Chemistry, by E. Frankland (Van Voorst).—Trowbridge's Annual of Scientific Discovery for 1870 (Trübner and Co.).—Stanford's Family Atlas; Stanford's Complete Atlas; Stanford's Cyclopædian Atlas (E. Stanford).—Mammalia: their various Orders and Habits, by L. Figuier (Chapman and Hall).—Researches into the Early History of Mankind, new edition, by E. B. Tylor (Murray).

FOREIGN (through Williams and Norgate).—Malacologia del Mar Rosso: A. Issel.—Lecons sur la Physiologie et l'Anatomie comparée de l'Homme et des Animaux, Tome ix. pt. 2: M.-Edwards.—Troschl's Archiv für N turgeschichte, 1870, pt. 1.—Publicato per cura dei Professori S. Richardi e G. Canestrini, Vol. II. Sect. 2.—Lehrbuch der chemischen Technologie zum Unterricht und Sebst-studium: D. F. Knapp.—XV. Tafeln zu H. Engelhardt's Flora der Braunkohlen-formation im Königreich Sachsen.

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